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Physics Final Exam Review Quiz

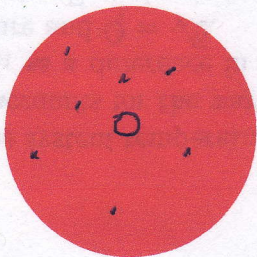
Unit 1

1) Perform the following unit conversions:

$$100\text{mm} = \underline{\hspace{1cm}} \text{km} \quad 100\text{mm} = 0.0001\text{km}$$

$$0.25\text{m} = \underline{\hspace{1cm}} \text{mm} \quad 0.25\text{m} = 250\text{mm}$$

2) Draw a target with low accuracy and low precision



3) If you measure the speed of light to be 286,000,000 m/s but the actual value is 300,000,000 m/s what is the percent error in your measurement?

$$\left| \frac{2.86 \times 10^8 - 3 \times 10^8}{3 \times 10^8} \right| (100) = 4.7\%$$

4) What is the metric prefix for a centimeter?

centi

Unit 2

1) A car traveling at 22.4 m/s skids to a stop in 2.55s. Determine the skidding distance of the car (assume uniform acceleration).

$$0 = 22.4 + a(2.55) \quad a = -\frac{22.4}{2.55} = -8.78$$

$$\begin{aligned} x_f - x_i &= 22.4(2.55) + \frac{1}{2}(-8.78)(2.55)^2 \\ &= 57.12 - 28.54 = 28.58\text{m} \end{aligned}$$

2) Any quantity with only magnitude and no direction is known as a _____.

A) Weight

B) Scalar

C) Unit

D) Vector

Explain the difference between a vector and a scalar:

Vector: direction and magnitude (number)

Scalar: magnitude only

3) On a distant planet a stone falls off a cliff for 4 seconds before striking the ground. If the stone fell 31.4 m what is the acceleration due to gravity on this planet?

A) KNOWN | UNKNOWN

$$v_i = 0$$

$$t = 4$$

$$x_f - x_i = 31.4$$

$$a = ?$$

B) EQUATION:

$$x_f - x_i = v_i t + \frac{1}{2} a t^2$$

C) WORK & ANSWER:

$$31.4 = 0(4) + \frac{1}{2} a 4^2$$

$$31.4 = 8a$$

$$a = 3.9 \frac{\text{m}}{\text{s}^2}$$

Unit 3

1) Objects in motion resist changes to their motion, and objects that are at rest tend to remain at rest, unless either is affected by an outside unbalanced force. Which one of Newton's Laws describe this concept?

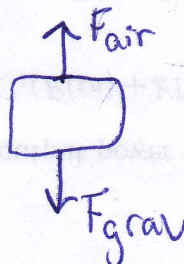
A) first

B) second

C) third

D) fourth

2) Draw a free-body diagram for an elephant free falling through the air (include air resistance). Make sure to label all of the vectors.



3) You hit a 0.5kg golf ball with 100N of force. How much does the ball accelerate?

$$a = \frac{100}{0.5} = 200 \text{ m/s}^2$$

4) Explain and give an example of Newton's Second Law:

Force equals the amount of acceleration applied to an object. An example is dropping a penny on your foot versus dropping a book on your foot. The book will cause more force because it has more mass.

Unit 4

1) What concept word is the "uniform" in uniform circular motion referring to?

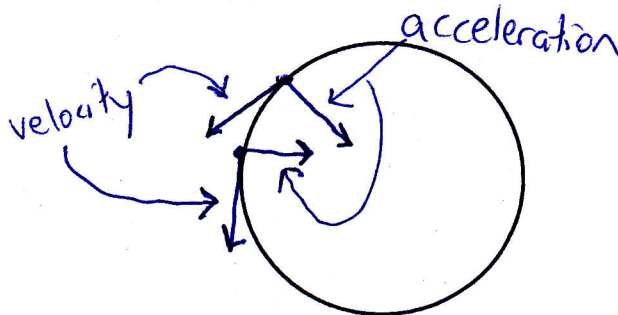
A) velocity

B) acceleration

C) time

D) mass

2) Label two consecutive velocity vectors and their acceleration vectors on the follow circle. Assume motion around the circle is counter-clockwise:



Unit 5

1) What is the difference between kinetic and potential energy?

kinetic energy is energy in motion.

Potential is stored energy based on height.

2) If a pendulum is pulled back and released will it swing to a height higher than it's starting height when it gets to the other side? Explain why or why not

No it won't because the higher height requires more energy than the pendulum started with.

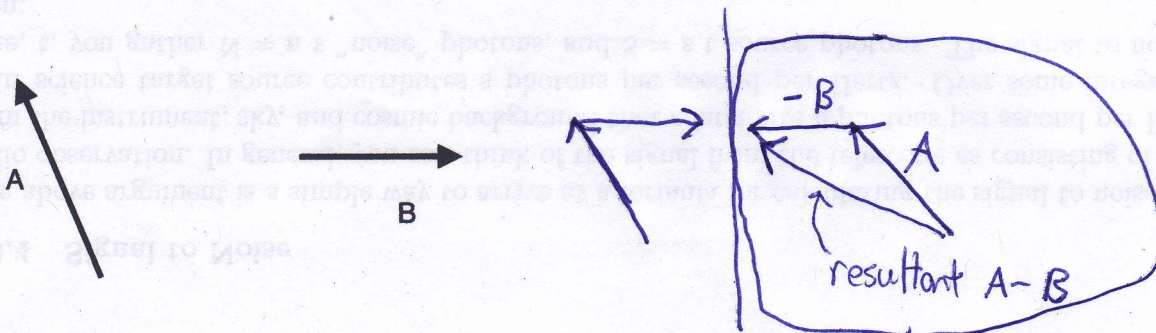
3) A weightlifter lifts a 45kg dumbbell 1 meter off the ground. How much work did he do?

$$W = FD = mgD = 45(9.8)(1) = 441 \text{ J}$$

4) How much power does it take for the weightlifter to lift the same dumbbell, 1 meter, in 2 seconds?

$$P = \frac{W}{T} = \frac{441}{2} = 220.5 \text{ Watts or } \frac{\text{J}}{\text{s}}$$

5) Draw and label the resultant vector after subtracting vector B from vector A:



Unit 6

1) Give your own version of a definition for the following terms:

Bimetallic strip	Two different metals that curve when heated
boiling	Substance changing from liquid to gas.
boiling point	Temperature at which something changes from liquid to gas.
calorie	Amount of heat needed to raise the temperature of one gram of water, one degree celsius.
calorimeter	A device for measuring the amount of heat in a substance.
Celsius scale	Temperature scale in which water boils at 100 degrees.
condensation	Substance changing from gas to liquid.
conduction	Heat transfer requiring objects to touch one another.
contract	To grow smaller

2) What are the units of heat? Joules

3) In the Ring & Ball demo, why does the ball expand when heated, thus preventing it from passing through the ring?

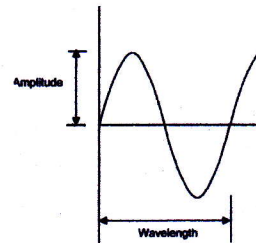
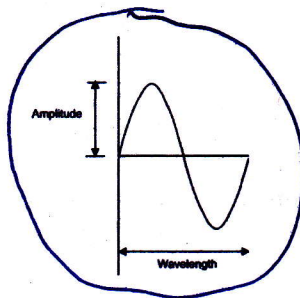
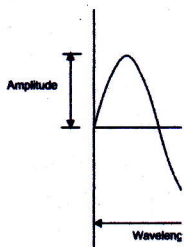
The molecules inside the ball gain kinetic energy and start moving around faster and faster, thus spreading out away from each other. The spreading out causes the overall structure of the ball to expand.

Unit 7

1) What is "node" short for and what does it represent on a standing wave?

[no displacement] Nodes represent the regions on a standing wave that are not moving.

2) Circle the diagram that represents one complete cycle?



3) What is the period of a wave whose frequency is 2.5 cycles/second?

$$P = \frac{1}{f} = \frac{1}{2.5} = 0.4 \text{ seconds}$$

4) If a wave travels at 300m/s and it has a wavelength of 5cm, what is its frequency in Hertz?

$$v = \lambda f \quad f = \frac{300}{0.05}$$

$$f = 6000 \text{ Hz}$$

$$5 \text{ cm} = 0.05 \text{ m}$$

5) If you throw two rocks into a pond, they create ripples (waves). What is it called when the ripples collide?

A) polarization

B) interference

C) acceleration

D) decay

6) In order to hear what someone next to you is saying, the air molecules between you and the person must move from their lips to your ears:

True or False

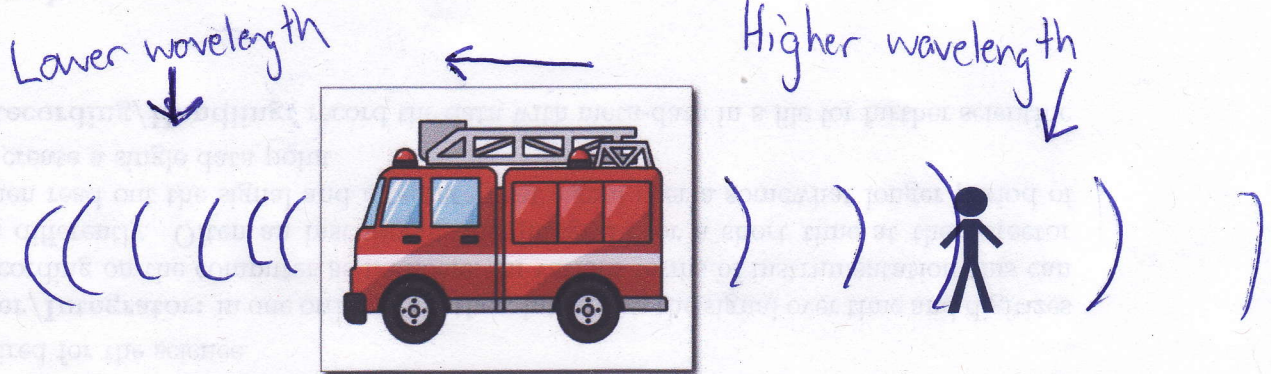
Explain why: The air molecules act as the medium to allow sound to travel to your ears in the form of a vibration of the molecules, but the molecules don't travel from mouth to ear.

Unit 8

1) A fire truck speeds away from you, towards a five-alarm fire at 25m/s. From where you are standing, you measure the fire truck's siren to be emitting at 600Hz as it moves away from you. What frequency is heard by the firemen on the firetruck?

$$600 = \frac{f}{1 + \frac{25}{340}} \quad f = 600 \left(1 + \frac{25}{340} \right) = 644 \text{ Hz}$$

2) The fire truck below is moving away from you. Draw sound waves that are coming towards you and the ones that are going out in front of the truck. Make sure the waves are spaced appropriately. (Hint: Something emitting sound that is come towards you, will cause you to hear a higher frequency sound than it is actually emitting.)



3) As you age you lose the ability to hear:

- A) low frequency sounds
- ☒ B) high frequency sounds
- C) ultrasonic frequency sounds
- D) infrasonic frequency sounds

4) The ear has three tiny little bones connected together that help you with hearing. They are called the:

- A) vitreous
- B) pinna
- C) cochlea
- ☒ D) ossicles

5) Why does blowing into a glass bottle with very little liquid in it, create a low pitch sound as compared to a bottle with a lot of liquid in it that creates a high pitched sound?

Small region of air allows only small wavelengths to form and since small wavelengths equal high frequency, you hear a higher pitched sound.

Unit 9

1) The colorful lines on an emission spectrum represent:

- ☒ A) wavelengths of light emitted by electrons
- ☐ B) wavelengths of light absorbed by electrons
- ☐ C) the result of electrons crashing into a nucleus
- ☐ D) electrons colliding with other electrons

2) When complementary colors overlap they produce:

- ☐ A) black
- ☐ B) gray
- ☒ C) white
- ☐ D) a rainbow

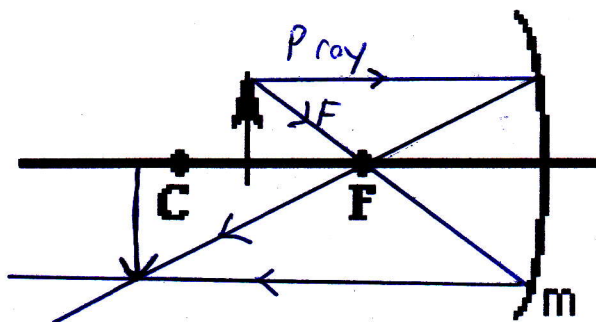
3)

- Draw at least two rays to locate the image in the following mirror setup
- Label all of the rays you use

- Circle the appropriate choices:

upright ☒ inverted

☒ real virtual



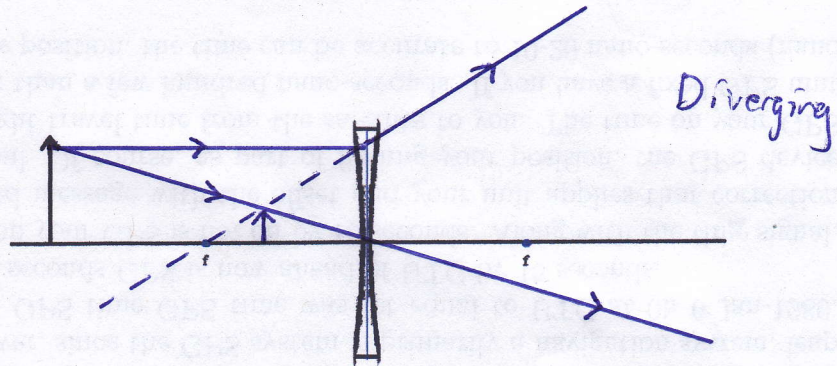
4)

- Draw at least two rays to locate the image in the following lens setup
- Label all of the rays you use

- Circle the appropriate choices:

upright inverted

real virtual



5)

- Draw at least two rays to locate the image in the following mirror setup
- Label all of the rays you use

- Circle the appropriate choices:

upright inverted

real virtual

